# SUBJECT INDEX

(Numbers in *italics* refer to charts, diagrams, graphs, photographs, or tables.)


ABO blood groups, drug action and, in red cell aggregation and deformability, 611–32
Acyl chains, deformation energy dependent on state of, 18–19
Adenosine 5′-diphosphate, *see* ADP
Adenosine triphosphate, *see* ATP
Adhesion
  in cardiovascular environment, 34–57
  cell-substratum, 66–81
  energy equations for, 139–40
  macromolecular and cell surface charge in, 410–25
  platelet
    to calcium, 351–62
    at different hematocrit levels, 370–73
    electric aspect of, 118–21
    flow leaving fibrinogen on glass, 504–12
    in whole blood, 368–70
Adhesion experiments, cell and protein surface tension determination from, 280–87
Adhesion processes, membrane-membrane, 13–33
ADP, platelet electrophoretic mobility influence of, 726–29
*Aeromonas salmonicida*, hemagglutination shear dependence induced by, 321–27
Agglutinin, red cell receptors for, 151, *153*
Aggregating agents, changes in sensitivity to, 736–37
Aggregation
  drug action on, 611–32
  energy for, in rouleaux formation, 190
  fluid shear stress in disruption of, 31–32
  platelet, 166–75
    biochemical and electrostatic considerations in, 693–708
    electric aspect of, 118–21
    surface charge and, 726–31
    in tube flow, 310–15
  processes of, 13–33
  red cell
    mechanical shearing effects on, 196–203
    in shear stress absence, 192–96, *193*
  shear-dependent, *E. coli* induction of, 327–29
  video micrographs of, *28*
  *See also* Vesicle aggregation
Albumin
  fibrin gel structure effect of, 400, *401*
  red cell deformation and, 592
Alcoholic disease, hepatic, red cell deformability and, 590
Amino groups, platelet distribution of, 725–26
Amphophiles, anionic, effect on erythrocyte properties of, 633–41
Angiotensin converting enzyme and carboxypeptidase N
  assays for, 443–44
  endothelial cell activities of, 447
Anionic amphophiles, effect on erythrocyte properties of, 633–41
Anticoagulative therapy, cancer cells arrested by, 684
Antisera, erythrocyte electrophoretic ability decreased by, 182
Antithrombogenic actions, antithrombotic action difference between, 385–86
Antithrombogenicity, multiphase polymeric materials and, 115–16, 121–24
Antithrombotic actions, difference between antithrombogenic action, 385–86
Antithrombotic agents, biological activity of, 513–24
Arterial blood, pulmonary endothelial cell participation in, 441–56
Arterial fluid dynamics, 710–11
Arterial wall
  filtration across, 105–8, *106*, *107*
  macromolecular transport across, 99–105
Arterioles, fluorescence intravital microscopy of, 428–40
Artificial heart chambers
  development of, 48–49, *49*
  problems of, 34–35, *35*
Artificial surfaces, blood interface at, 471–503
Atherogenesis, localization of, fluid dynamics in, 709–19
ATP
  depletion of, red cells and, 241
  erythrocyte shape change and, 60–61
  platelet electrophoretic mobility influence of, 726–29

Bacteria

erythrocyte interactions with, under shear, 319–31
pathogenic, antiphagocytic devices of, 345–46
phagocytic ingestion surface tension measurements of, 292–95
Bilayers
isolated, expansive tension in, 6–7
real, stretched tension in, 6
Bilayer sensor model, of erythrocyte shape control, 58–65
Bioadhesive events, surface chemical factors presaging, 34–57
Biochemical considerations, in platelet aggregation, 693–708
Biologic grafts, development of, 574–78
Blood
arterial, pulmonary endothelial cell participation in, 441–56
blood vessel interface with, 115–27
viscosity of, capillary viscometer wall effect on, 116–18, *117*
whole, platelet adhesion in, 368–70
Blood contact phenomena, 38–42
Blood groups, ABO, drug action and, 611–32
Blood interface at artificial surfaces, 471–503
Blood pumps, dual pusher-plate, 481–82
Blood rheology, drug effects on, 615–20
Blood vessel leakage, macromolecular and cell surface charge in, 410–25
Blood vessels, substitute, development of, 49–52
Boltzmann equation, 73

Calcification as problem in circulatory support devices, 478
Calcium
cellular role of, 655–56
platelet adhesion to, 351–62
red cell deformability and, 590, 592, 593
Calcium regulation of glycoproteins in human platelet membranes, 166–75
Cancer
anticoagulative therapy in, 684
dietary relation to, 627
Cancer cell damage, at vascular endothelium, 681–92
Cannula platelet consumption, measurement of, 643–44
Capillaries
barriers in permeability of, 380–81
endothelial cell in transmission in, *93*
fragility and permeability of, cement fibrin and, 382–83
red cell passage through, 1
Capillary endothelium, vesicular transport of proteins by, 457–67
Capillary flow, charge effect in, 118
Capillary viscometer, blood viscosity effect on wall of, 116–18, *117*
Capillary walls
architecture of, 379–80, *379*
leukocyte emigration traversing of, 383–84
Carboxyls, platelet distribution of, 721–24
Cardiovascular environment, adhesion in, 34–57
Cardiovascular risk factors, platelet sensitivity and, 733–34
Cation adsorption, at electrophoretic surface, 179
Cell aggregation, membrane deformation and adhesion in, 13–33
Cell-cell interaction
biological dynamics of, 66–81, *67*
flow dynamics of, 88–89
Cells
aged and abnormal, disposal of, 346
age of, erythrocyte properties affected by, 180–81
curvature of, aggregation energy relationship to, *195*
dying, axial and radial concentration profiles for, *104*
electrochemical interaction between, 738
elution of, from substrates, 287–89
isotropic tension of, 24
phagocyte interactions with, 332–50
repulsion forces for, 75
shear-induced collisions between, 299–318
surface tensions of, measurement of, 276–98
*See also* Erythrocytes; Red cells
Cell shape, functional properties and, 58–65, *59*
Cell surface, electrostatic and functional properties of, 66–81
Cellular suspensions, membrane glycoprotein coat and, 85
Cement fibrin, capillary permeability and fragility and, 382–83
Cerebrovascular diseases, hemorheology in, 651–61
Charge
capillary flow effect of, 118
surface, of transformed and deteriorated erythrocytes, 149–58
Charged polymers, platelet surface charge and, 731–32
Cigarette smoke, effect on blood of, 617, *620*, 624

Circulatory diseases, hemorheological abnormality role in, 599–602
Circulatory support systems, mechanical, 471–503
Coagulation factors, surface phenomena of, 426–40
Collagen, platelet electrophoretic mobility influence of, 729
Collisions, shear-induced, between cells, 299–318
Colloidal particles, Poiseuille flow interactions between, 299–318
Colloidal suspensions, stability of, 83–91, *85*
Colloidal systems, surface reactions of, 13–14
Contact angles, cell and protein surface tension determination from, 278–80
Cytoplasm, viscous flow of, 207–24

Deformability
  drug action on, 611–32
  physiochemical determinants of, 654–56
  red cell, 585–98
Deformation
  in shear, of red cells, 225–54
  *See also* Deformability; Membrane deformation; Membranes; Vesicle deformation
Deforming spherical vesicles, analyzing scheme for, *6*
Dextran
  as red cell aggregation suspension medium, 191, 193–94, *194*
  fibrinogen inhibitory action by, 387–89
  red cell geometry effects of, 255–62
Dextran solutions, aggregation potential in, 27–31
Diet, blood rheology affected by, 618–20, 626–27
DilaurylPC, repulsion states of, 2
DimyristoylPC, repulsion states of, 2
Dinitrophenyl, *see* DNP
DioleylPC, repulsion states of, 2
Disaggregation
  energy equations for, 139–40
  rouleaux, model of, 142–46, *142*
Disease
  electrokinetics and, 732–34
  erythrocyte electrophoretic property effects of, 181
Disease, surface charge and, 738
DLVO theory, inadequecy of, 66–67
DNP, lactic acid production and, 60
Doublets, red cell, rotation and breakup of, 307–10
Drugs
  aggregation and deformability action of, 611–32
  hemorheoactive, screening of, 656–58
  hemorheological assessment of, 599–610
  platelet function inhibiting by, 642–50, 646
  surface charge and, 734–37
Dual pusher-plate blood pump, 481–82

Echinocytes, 58
*E. coli*, shear-dependent aggregation induced by, 327–29
EggPC, repulsion states of, 2
Electrochemical properties of erythrocytes, 176–89
Electrokinetics, disease and, 732–34
Electrophoresis, for study of red cell surface charge, 176–89
Electrophoretic mobility, thrombopathy and, 732–33
Electrophoretic surface, cation adsorption at, 179
Electrostatic considerations in platelet aggregation, 693–708
Electrostatic repulsion of cells and proteins, surface potentials and, 335
Elution of cells from substrates, 287–89
Endoendothelial fibrin lining, endothelium-blood interface and, 377–96
Endothelial cell layer, mathematical models for transport across, 92–114, *93*
Endothelial cells
  macromolecular diffuse surface zone over, 83–91
  epididymal fat isolation from, 457–58
  pulmonary, surface properties of, 441–56
Endothelial injury
  mathematical model for, *100*, 101–5
  micrograph of, *99*
Endothelial lining, heparinized surface comparison with, 532–33
Endothelial micropinocytosis, general properties of, 459
Endothelial surface, velocity profiles in, *109*
Endothelium, atherogenesis and, 711–15
Endothelium-blood interface, endoendothelial fibrin lining and, 377–96
Energies
  interaction, 3, *4*, 5, *7*
  mechanical equilibrium of, 14
  steric and electrostatic interaction, *76*
Enzymes, red cell studies and, 182
Epididymal fat, endothelial cell isolation from, 457–58

Erythrocyte filterability tests, 656–58, *657*
Erythrocyte glycocalyx, electrostatic characterization of, *69*
Erythrocyte interactions, energetic model of, 72–79
Erythrocyte membrane spectrin, structure and function of, 159–65
Erythrocytes
  adhesiveness investigation of, 68
  anionic amphophiles effect on, 633–41
  bacteria interactions with, under shear, 319–31
  electrochemical properties of, 176–89
  electrostatic potential profile of, *74*
  mobility of
    biological variables in, 179–81
    physiochemical variables in, 177–81
  old, transformed, and deteriorated, surface charge of, 149–58
  surface modification of, 182–85
  washed human, aggregation of, 71–72
  *See also* Red cells
Erythrocyte shape, membrane components in, covalent modification of, 622–80
Erythrocyte shape control
  bilayer sensor model of, 58–65
  $H_2O_2$ and methylene blue effects on, *61*
*Escherichia coli*, *see E. coli*
Eukaryotic cells, microorganism adhesion to, 319
Expanders, adhesive contacts mediated by, 13–14

Ferric colloid histochemistry, 412
Fibrin
  immunohistochemical detection of, 412
  tubes coated with, blood viscosity reduction in, 117–18
Fibrin gels
  permeation of, 397–400, *398*, *399*
  plasma protein interaction with, 400–2
  surface hemorheology implications of, 397–409
Fibrinogen, 38–39
  immunohistochemical detection of, 412
  platelet adhesion and, 504–12
  platelet plasma binding of, 170–71, *171*
  red cell adhesion reduced by elevation in, 270
Fibrinogen gel clotting, endothelium-blood interface and, 377–96
Fibroblasts, adhesiveness of, 68
5HT, platelet electrophoretic mobility influence of, 726–29
FL cells, adhesiveness of, 68
Fluorescence intravital microscopy, coagulation factors observed by, 426–40
Flow, blood, macromolecule role in, 82–91
Fluid dynamics in atherogenesis, 709–19
Fluid shear stress, aggregation disruption and, 31–32
Foreign surfaces, platelet adhesion to, 351–62
Fragility of capillaries, 382–83
Free energy G of binary mixture, *84*
Freezing-front technique, cell surface tension measurements with, 289–91

Genetics, rheological responses influenced by, 623–27
Germanium, test plate use of, 37–38, 43
Giant unilamellar vesicles (GUV)
  area dilation in, 19
  as size category, 18
Glass
  platelet adhesion to, 353–56, *356*
    fibrinogen on, 504–12
Glutaraldehyde-stabilized ionic heparin complex, studies on, 525–30
Glycoproteins
  calcium regulation of, 166–75, *168*, *169*
  cell surface function of, 83–91
Glycosaminoglycans, fibrinogen inhibitory action by, 387–89
Grafts, biologic, development of, 574–78
GUV, *see* Giant unilamellar vesicles

Hageman factor, plasma coagulation initiated by, 122, *122*, 124
Halothane, effect on blood viscosity of, 617
Hamaker coefficients, van der Waals attraction and, 333–34
Hemagglutination
  bacterial adhesion detected by, 319–20
  shear dependence of, 321–27, 329
Hematocrits
  measurement of, 586
  platelet adhesion at different levels of, 370–73
  platelet deposition influence of, 366–68
Hemoglobin, flow and dissipation of membrane recovery production of, 207–12
  tether production of, 214–20
Hemorheoactive drugs, screening of, 656–58
Hemorheological abnormalities, therapeutic approaches to, 652–54
Hemorheological action, pharmacological agents with, 599–610

Hemorheological changes, red cell deformability as criterion of, 585–98
Hemostasis
aggregation as functional difference essential to, 166–75
fibrinogen gel clotting as initial event in, 386–87
Heparin, immobilization of, 514–17
Heparin-glutar, platelet interaction with, 526–27
Heparinized materials, surface, thromboresistance of, 525–37
Heparin surface
application of, 533–35
covalently bonded, studies on, 530–32
endothelial lining comparison with, 532–33
Hepatic alcoholic disease, red cell deformability and, 590
Hydration forces, decay of, 2–3
Hydrophobicity of polymer interface, thrombogenesis and, 538–60

Immunoglobulins, action of, 346–47
Ingestion, macromolecular and cell surface charge in, 410–25
Implants
host tissue bonding of, 42–53, *44*, *45*, *48*
tissue debris left on, 47
Intercellular space, transport through, 108–13
Interface phenomena, physical theory of, 115–27
Intermembrane forces, deformation in response to, 6–8
Intramembranous particles, diffusion coefficient of, 131, 133
Ionic heparin complex, glutaraldehyde-stabilized, studies on, 525–30
Ionic solutions, erythrocyte interactions in, 72, 78
Iron colloids, microscopy staining with, 412
Ischemic cerebrovascular disease, rheological properties of blood in, 651–52, *652*
Isotropic tension of cells and vesicles, 24

Lactic acid, DNP in production of, 60
Lamina, internal elastic, electron micrograph of, *51*
Large unilamellar vesicles (LUV)
area dilation in, 19
as size category, 18
Leakage, blood vessel, macromolecular and cell surface charge in, 410–25
Lecithin, synthetic vesicles of, 29
Left ventricular assist systems, artificial surfaces within, blood interface at, 471–503
Leukocyte emigration, capillary wall traversing by, 383–84
Lipid layers, liposome interaction with, 66–67
Lipids, blood circulation effects of, 617–18
Lipoproteins, uptake of, 94
Liposomes, lipid layer interaction with, 66–67
Long-term left ventricular assist systems, 471–503
LUV, *see* Large unilamellar vesicles

Macromolecules
adsorbed, size of, *87*
adsorption of, endoendothelial fibrin lining and, 389–90
membrane-bound, flowing blood role of, 83–91
vascular interface movement of, 92–114
Malonyldialdehyde, spectrin phosphorylation effects of, 663, 664
Mathematical model of endothelial cell layer, 92–114
Mechanical circulatory support systems, 471–503
Mechanical shearing, red cell aggregation effects of, 196–203
Membrane adhesion, equilibrium and energetics of, 20–27
Membrane curvature, as cellular process factor, 58–65
Membrane deformation
independent modes of, *17*
in vesicle aggregation, 13–33
Membrane disk, velocity field and streamlines caused by, 210, *211*
Membrane proteins, 128–37
Membranes
cell-body-to-elastic-tether flow of, 212–14, *213*
deformation and adhesion in cell and vesicle aggregation of, 13–33
displacement of, 22–23, *23*
elasticity of, dextran and polyvinylpyrrolidone effects on, 255–62
electrostatic properties of, 68
interaction and deformation of, 1–12
optimal thickness of, 133–34
physical processes within, 134–35
proteins in, 131–35

radial tension of, 23–24
recovery of, tether contraction and, 207–24
red cell chemical affinity between, 27–31
Membrane skeletal complex
arrangement of, 162–63
spectrin as component of, 159–65
Membrane skeleton, as shape control element, 58–65
Metastasis, description of, 681, 688
Mice, red cells of
electron microscopy of, 236–37
shear behavior of, 233–36
Microbes, phagocyte interactions with, 332–50
Micropinocytosis, endothelial, general properties of, 459
Microscopy
fluorescence intravital, coagulation factors observed by, 426–40
transmission electron, OTO or OTOTO methods for, 442
Mitosis, doubling process of, 46
Molecular motions, thrombogenesis and, 538–60
Monolayers, membrane protein, 128–29
Morphology, cellular, functional properties and, 58–65
Multilayers, membrane protein, 129–30
Multiphase polymeric materials, anti-thrombogenicity and, 115–16, 121–24
Multivalent ligands, adhesive contacts mediated by, 13–14
Mural thrombogenesis, platelet and red cell involvement in, 363–76

Neuraminidase, erythrocyte studies with, 182
Noradrenalin, platelet electrophoretic mobility influence of, 726–29
Novacor LVAS, 480–81, *481*

PCs, *see* Phosphatidylcholines
Pentoxifylline, 664, *670*, 675–76
hemorheological changes and, 591
membrane phosphoprotein effect of, 667–68, *668*
Peptides, in spectrin, 159–61, *161*
Permeability, capillary, barriers in, 380–81
Permeable cell model, flux and uptake of, 103–5, *103*, *105*
PEs, *see* Phosphatidylethanolamines
Phagocytes, cell and microbe interaction with, 332–50
Phagocytic ingestion, cell and bacteria surface tension measurements from, 292–95
Pharmacological agents
aggregation and, deformability action of, 611–32
hemorheological assessment of, 599–610
platelet function inhibiting by, 642–50, *646*
Pharmacology, surface charge and, 738–39
Phosphates, platelet distribution of, 724
Phosphatidycholines (PCs)
interaction energies of, *5*
repulsion states of, 2
repulsive pressure between, *4*
Phosphatidylethanolamines
interaction energies of, 5
repulsion states of, 2
Phosphatidylserine (PS), bilayer collapse of, 5, *8*
Phospholipid bilayer membranes as interaction and deformation model, 1–12
Phospholipid bilayer vesicles, elastic deformation energy of, 18
pH relationship, red cell electrophoretic ability versus, 177–78
Plasma
aggregation potential in, 27–31
changes in, molecules acting through, 736
macromolecule solution role in, 89
Plasma coagulation, Hageman factor initiation of, 122, *122*, 124
Plasmalemma, morphology determination of, 58–65
Plasma proteins
adhesive contacts mediated by, 13–14
fibrin gel interaction with, 400–2
Platelet agglutination, von Willebrand factor-dependent, 697–704
Platelet electrophoresis, trends in, 737–39
Platelet function, drug inhibition of, 642–50, *646*
Platelet inhibitory drugs, effects of, 642–50, *646*
Platelet membranes
calcium regulation of glycoproteins in, 166–75
ionizable groups of, 720–21
Platelet membrane surface, topochemistry of, 737–38
Platelets
adhesion of
electric aspect of, 118–21
flow leaving fibrinogen on glass, 504–12
at levels of different hematocrit, 370–73
in whole blood, 368–70
adhesion to calcium of, 351–62
aggregation of, 166–75

biochemical and electrostatic considerations in, 693–708
surface charge and, 726–31
in tube flow, 310–15
coming together of, 696–97
electromagnetical properties of, 720–41
heparin-glutar interaction with, 526–27
as isolated cell fragments, 693–96
mural thrombogenesis involvement of, 363–76
primary attachment of, 38–40, *39*
surface charge of, charged polymers and, 731–32
Platelet surface groups, distribution of, 721–26
Poiseuille flow, colloidal particle interactions in, 299–318
Poisson equation, interacting plate electric potential determined by, 73
Poly-L-lysine, for red cell agglutination, 149
Polymer formation, fibrin gel and, 402–5
Polymeric materials, surface properties of, thrombosis correlation between, 538–60
Polymers, charged, platelet surface charge and, 731–32
Polymer surfaces, antithrombotic agents immobilized on, biological activity of, 513–24
Polysaccharides
estimation of ionized groups of, 411
sulfated, studies on, 525–30
Polyvinylpyrrolidone, red cell geometry effects of, 255–62
Prostaglandin, immobilization of, 519–22
Protease, erythrocyte studies with, 183
Protein adsorption, platelet adhesion to calcium and, 353
Proteins
estimation of ionized groups of, 411
extrinsic, surface pressure as function of surface area, *129*
Hamaker coefficients and van der Waals attraction of, 333–34
membrane, in monolayers and multilayers, 128–37
surface tensions of, measurement of, 276–98
vesicular transport of, by capillary endothelium, 457–67
PS, *see* Phosphatidylserine
Pulmonary endothelial cells, surface properties of, 441–56

Red cell doublets, rotation and breakup of, 307–10
Red cells
adhesion test for, 24–25, *25*
aggregation affinities in, *29*
aggregation and deformability of, drug action on, 611–32
aggregation potential for, 29–30, *30*
bonding energy of, 77
capillary passage of, 1
collision efficiency of, *70*, *71*
deformability of, 585–98
physiochemical determinants of, 654–56
deformation in shear of, 225–54
elastic properties of membrane of, 18
electric mobility range in, 149–51
energy contours for, *26*
geometry of, dextran and polyvinylpyrrolidone effects on, 255–62
interactions of, energy balance in, 190–206
membrane chemical affinity between, 27–31
membrane protein of, surface viscosity of, 129–30, *130*
of mice
electron microscopy of, 236–37
shear behavior of, 233–36
morphology and rheology of, urea effects on, 237–41
mural thrombosis involvement of, 363–76
schematic representation of interacting, *73*
sedimented layers of, yield stress in, 263–75
sialic acid removal as cause of shorter life span of, 150–51
sphered, two-body collisions between, 301–7
studies of, 586
surface charge in, 176–89
ionic strength and, 178–79
modifications of, 183–84
suspension stability of, *70*
*See also* Erythrocytes
Rheology, blood, drug effects on, 615–20
Rigidity, body deformability characteristics and, 15–20
Rouleaux formation
aggregating energy for, 190
and disaggregation, theoretical models of, 138–48
Rouleaux shapes, *141*

Sediment slumping velocity, 269–70
Serum, fibrin gel structure effect of, 400
Serum albumin, as macromolecule in solution, 89
Shear

deformation in, of red cells, 225–54
erythrocyte and bacteria interactions under, 319–31
Shear dependence of hemagglutination, 321–27, 329
Shear-induced collisions between cells, 299–318
Shear stress
quantification of, for red cell disaggregation, 192
red cell aggregation in absence of, 192–96, *193*
Sialic acid
plasma glycoprotein catabolism control role of, 180–81
red cell life span shortened by removal of, 150–51
Sickle cell crisis, yield stress elevated in, 263
Silicon, test plate use of, 37–38
Stomatocytes, 58
Small unilamellar vesicles (SUV)
anomalous behavior of, 19–20
planar contacts between, 22
as size category, 18
Spectrin
erythrocyte membrane, structure and function of, 159–65
peptides of, 159–61, *161*
rotary shadowed, 159, *160*
Spectrin-actin multilayers, surface properties of, 130, *132*
Spectrin phosphorylation, malonyldialdehyde effect on, *663*, 664
Sphered red cells, two-body collisions between, 301–7
Stable suspensions, cell surface tension measurement from, 291–92
Steric interaction, interaction energy elevation and, 79
Substrates, cell elution from, 287–89
Sulfated polysaccharides, studies on, 525–30
Sulfhydryls, platelet distribution of, 724–25
Surface charge
disease and, 738
drugs and, 734–37
macromolecular and cellular, in adhesion, ingestion, and blood vessel leakage, 410–25
pharmacology and, 738–39
platelet, charged polymers and, 731–32
of red cells, modifications of, 183–84
of vascular interface, thrombosis and, 561–83
Surface chemical factors, bioadhesive events presaged by, 34–57
Surface elastic modulus, of red cell membrane proteins, 130, *131*
Surface-energy states, host tissue response to, *36*
Surface heparinized materials, thromboresistance of, 525–37
Surface-induced thrombosis, occurrence of, 513
Surface order, thrombogenesis and, 538–60
Surface phenomena of coagulation factors, 426–40
Surface potentials, electrostatic repulsion of cells and protein and, 335
Surface tensions, measurement of, 276–98
SUV, *see* Small unilamellar vesicles

Tether contraction, membrane recovery and, 207–24
Thalassemic cells, surface charge density of, 155
Thrombin
platelet electrophoretic mobility influence of, 729
as specific for dissociated glypcoproteins, 169–70, *169*
Thrombogenesis
mural, platelet and red cell involvement in, 363–176
polymeric materials surface properties correlation between, 538–60
Thrombopathy, electrophoretic mobility and, 732–33
Thromboresistance, requirements for, of surface heparinized materials, 525–37
Thrombosis
surface charge and, 561–83
surface-induced, occurrence of, 513
Thrombotic disease, surface charge in, 733
Tissue contact phenomena, 42–48
Topochemistry of platelet membrane surface, 737–38
Transmission electron microscopy, OTO or OTOTO methods for, 442

Urea, red cell effects of, on morphology and rheology, 237–41
Urokinase, immobilization of, 517–19

Van der Waals attraction, Hamaker coefficients and, 333–34
van der Waals interactions, 1, 2–3
Vascular endothelial lining, damage to, *50*
Vascular endothelium, cancel cell damage at, 681–92

Vascular interface
macromolecular movement across, 92–114
surface charge of, thrombosis and, 561–83
Vegetarian diet, disease prevented by, 627
Ventricular assist systems, artificial surface within, blood interface at, 471–503
Venules, fluorescence intravital microscopy of, 428–40
Vesicle aggregation
deformability effect in, *15*
membrane deformation and adhesion in, 13–33
Vesicle deformation
coefficients for, *20*
dehydration and temperature effects on, *21*
Vesicles
adhesive contact thresholds for, 22
isotropic tension of, 24
lipid bilayer, geometry of, 27
*See also* Giant unilamellar vesicles; Large unilamellar vesicles; Small unilamellar vesicles
Vesicular ingestion
carbohydrate-selective, 461–64, *463*, *464*
kinetics of, 459–61
quantification of, 458–59, *458*
specificity of, 461
Vesicular transport
mathematical model of, 95–98, *96*, *98*
of proteins by capillary endothelium, 457–67
Viscometric hemagglutination assay, 320–21
Viscosity of cytoplasm and red cell membrane, 207–24
Viscous properties in adhesion processes, 15–16

Water removal, structural consequences of, 2
White cells, electron micrograph of, *40*

Yield stress in sedimented red blood cell layers, 263–75

Zwitterionic phospholipids, repulsion in pure water of, 2